

## **REMARKS**

### **Introductory Remarks**

In this response, Applicants cancel claims 18, 19, 21, 25-29 and 31-33 without prejudice, amend claims 36 and 38-42 and the specification, and address the Examiner's objections and rejections. Support for the amendments to the claims can be found throughout the application. Amendments to the claims are being made solely to expedite prosecution and do not constitute an acquiescence to any of the Examiner's objections or rejections. Applicants' silence with regard to the Examiner's rejections of the dependent claims constitutes recognition by Applicants that the rejections are moot based on Applicants' amendment and/or Remarks relative to the independent from which the dependent claims depend. Applicants reserve the option to further prosecute the same or similar claims in the present or a subsequent application. Upon entry of this Response, claims 36-45 are pending.

### **Amendments to the Specification**

Applicants have amended paragraphs 0022, 0044 and 0056 to delete the embedded hyperlink therein.

### **Amendments to the Claims**

Applicants have amended claims 36 and 38-42 to correct informalities or insert the equation in place of reference thereto.

No new matter is introduced by way of the amendments. Applicants respectfully request their entry.

### **Summary of the Office Action**

Claims 18, 19, 21, 25-29 and 31-33 and 36-45 were pending. Claims 18, 19, 21, 25-29 and 31-33, previously withdrawn from consideration by the Examiner as being directed to a constructively non-elected invention, are canceled herein without prejudice.

Of the claims considered, the Examiner has rejected claims 36, 37, and 39-42 under 35 U.S.C. § 112 as allegedly indefinite. The Examiner has rejected claims 36-45 under 35 U.S.C. § 101 as allegedly being drawn to nonstatutory subject matter. The Examiner has

rejected claims 38 and 43 under 35 U.S.C. § 102(e) as allegedly anticipated by U.S. Patent No. 6,772,069 to Eisenberg et al. (“Eisenberg”). The Examiner has rejected claims 36-45 under 35 U.S.C. 103(a) as allegedly unpatentable over Eisenberg in view of U.S. Patent No. 6,594,587 to Askenazi et al. (“Askenazi”) in view of U.S. Patent No. 6,203,897 to Friend et al. (“Friend”) as evidenced by U.S. Patent No. 5,604,100 to Perlin. (“Perlin”). The Examiner has objected to claim 38 because of informalities.

In this response, Applicants address the Examiner’s rejections and objections. It is respectfully submitted that the references cited by the Examiner do not anticipate or render obvious pending claims 36-45. Applicants have amended claims 36 and 38-42 to address the Examiner’s objection and to clarify the claimed subject matter. As such, no new matter has been added. Applicants respectfully traverse the rejections and respectfully request reconsideration and withdrawal of the rejections based on the following remarks.

#### **The Objections to the Claims**

The Examiner objected to claim 38 on formal grounds. Applicants have amended claims 38 to address the informality that was kindly noted by the Examiner.

#### **The Rejections Under 35 U.S.C. § 112**

The Examiner has rejected claims 36, 37 and 39-42 under 35 U.S.C. § 112, second paragraph, as allegedly indefinite, for the reasons set forth on pages 3-4 of the instant Office Action. Applicants have amended the claims to recite the equations themselves, rather than referring to, for example “equation 10”. These amendments are not related to patentability. As such, Applicants respectfully request that the Examiner withdraw these rejections.

#### **The Rejections Under 35 U.S.C. § 101**

The Examiner has rejected claims 36-45 under 35 U.S.C. § 101 as allegedly directed towards nonstatutory matter, for the reasons set forth on pages 4-6 of the instant Office Action. Applicants respectfully traverse the rejections.

Among other things, Applicants respectfully submit that both claims 36 and 38 both feature steps wherein information is provided to a user or further processor. While the Examiner acknowledges that providing the claimed information to a user does provide a tangible,

real-world result, the Examiner alleges that providing said information to a further processor does not. Applicants respectfully disagree with the assertion that providing information to a further processor as claimed does not meet the requirements of 35 U.S.C. § 101. Specifically, Applicants note that a useful, concrete and tangible result (*i.e.* a molecular interaction network representation) that may be provided to the further processor may be used as part of a further processing step. Applicants also note that in the Final Office Action issued on April 16, 2007, the Examiner noted that a similar rejection could be overcome by amending the claims to recite that a result of the application is outputted to a display, a user, a readily accessible memory or another computer on a network. (April 16, 2007 Office Action at page 9). Applicants respectfully submit that providing information to a processor as claimed is similar to providing results to a memory or computer on a network as described by the Examiner with respect to the rejection.

Applicants therefore request that the rejection under 35 U.S.C. §101 of independent claims 36 and 38 and dependent claims 37 and 39-45 be withdrawn.

### **The Rejections Under 35 U.S.C. § 102**

The Examiner has rejected claims 38 and 43 under 35 U.S.C. §102(e) as allegedly anticipated by Eisenberg, for the reasons set forth on pages 7-9 of the instant Office Action. Applicants respectfully traverse the rejection.

To show that claims 38 and 43 are anticipated, the Examiner must show that “each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” MPEP § 2131; *Verdegall Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631 (Fed. Cir. 1987). “Under the principles of inherency, if the prior art necessarily functions in accordance with, or includes, the claimed limitations, it anticipates.” *Mehl/Biophile Int’l Corp. v. Milgraum*, 192 F.3d 1362 (Fed. Cir. 1999). Importantly, “[t]he mere fact that a certain thing may result from a given set of circumstances is insufficient to prove anticipation.” *Electro Med. Sys., S.A. v. Cooper Life Sciences, Inc.*, 34 F.3d 1048 (Fed. Cir. 1994). Applicants respectfully submit that Eisenberg does not show “each and every element” of the claims.

Claim 38 is directed to a method for identifying a molecular interaction of a molecule within a biological network. Among other things, the method in claim 38 features

“determining probability of attraction between the conserved features of [a] molecule and other interacting molecules” and “determining probabilities of molecular interactions of said molecule with each of the other interaction molecules based on the probabilities of attraction.” The Examiner takes the position that Eisenberg discloses these features of claim 38. (Office Action, pages 7-8).

Eisenberg describes the use of methods and systems to infer functional links from genome sequences. More specifically, Eisenberg describes methods for identifying proteins as having a functional link, identifying polypeptides as having a functional link and determining an evolutionary distance between two proteins. In the portion of Eisenberg cited by the Examiner, Eisenberg describes the construction of a conditional probability matrix for proteins within a family, which the Examiner asserts anticipates “determining probability of attraction between conserved features of [a] molecule” as featured in claim 38. Applicants respectfully disagree. Instead, Eisenberg describes the use of a conditional probability matrix to determine the probability of an evolution process occurring. Specifically, the probability matrix described in Eisenberg is used to help determine the probability that *aa* will evolve into *aa'*, where *aa* and *aa'* are amino acids. (Eisenberg, col. 4, lines 45-54). Predicting the probability that one amino acid will evolve *into* another (*aa* to *aa'*) as described in Eisenberg does not disclose or suggest determining the probability of *attraction* between features of a molecule as recited in claim 1.

Eisenberg also describes accounting for conserved alignment in the constructed conditional probability matrix by accounting for conserved alignment in the probability matrix by taking the product of the conditional probabilities of each aligned pair of the sequences by using the equation  $P(p) = \prod p(aa \rightarrow aa')$ . The Examiner asserts that these elements of Eisenberg anticipate “determining probabilities of molecular interactions of said molecule with each of the other interaction molecules based on the probabilities of attraction” as featured in claim 38. Again, Applicants respectfully disagree. Like the conditional probability matrix discussed above, accounting for conserved alignment as described in Eisenberg helps to determine the evolutionary distance between proteins and to assess the likelihood that one amino acid or protein will *evolve into* another. This is not the same as determining probabilities of molecular interactions as featured in claim 38. Determining evolutionary distance as described in Eisenberg does not disclose or suggest determining molecular interactions in any way.

For at least these reasons, Applicants respectfully submit that claim 38 is non-obvious and patentable over Eisenberg. Furthermore, since claim 43 depends from claim 38, claim 43 is allowable for at least these same reasons. Accordingly, Applicants respectfully request the rejection under 35 U.S.C. § 102(e) be withdrawn.

### **The Rejections Under 35 U.S.C. § 103**

The Examiner has rejected claims 36-45 under 35 U.S.C. § 103(a) as allegedly unpatentable over Eisenberg as applied to claims 38 and 43 in view of Askenazi and Friend as evidenced by Perlin, for the reasons made of record on pages 9-14 of the instant Office Action.

To reject claims under Section 103, an examiner must establish a *prima facie* case of obviousness. Using the Supreme Court's guidelines enunciated in *Graham v. John Deere*, 383 U.S. 1, 17 (1966), one determines "obviousness" as follows:

Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or nonobviousness of the subject matter is determined.

In *KSR Int'l Co. v. Teleflex Inc.*, No. 04-1350 (U.S. April 30, 2007), the Supreme Court reaffirmed the *Graham* test, and indicated that, although it should not be rigidly applied, a useful test for determining obviousness is to consider whether there is a teaching, suggestion or motivation in the prior art that would lead one of ordinary skill in the art to combine known elements of the prior art to arrive at the claimed invention. Importantly, the Court emphasized that a patent examiner's analysis under section 103 should be made explicit to facilitate review.

Thus, to establish a *prima facie* case of obviousness, the Examiner has an obligation to construe the scope of the prior art, identify the differences between the claims and the prior art, and determine the level of skill in the pertinent art at the time of the invention. The Examiner must then provide: (1) an explicit, cogent reason based on the foregoing why it would be obvious to modify the prior art to arrive at the claimed invention; (2) a reasonable expectation of success; and (3) a teaching or suggestion of all claimed features. See M.P.E.P. §§ 706.02(j) and 2143.

Claim 36 is directed to a method for identifying a molecular interaction network representation for a set of interacting molecules. Among other things, the method recited in claim 36 features “determining attraction probabilities between pairs of molecules of the set of interacting molecules based on known molecular interaction data” and “determining an edge probability ... for each possible molecular interaction network.” No such feature is disclosed in or suggested by Eisenberg, Askenazi and Friend, whether considered individually or in combination.

#### No Motivation to Combine

As an initial matter, Eisenberg is directed to a method, system and computer program for inferring functional links from genome sequences. (*See* Eisenberg, Abstract). In contrast, Askenazi describes a system and method for determining associations among a set of biological elements using an algorithm that is capable of generating a Steiner tree. (*See* Askenazi, Abstract). Friend is directed to methods for enhanced detection of biological response patterns. (*See* Friend, Abstract) The cited references are concerned with solving different problems, and there would be no reason or likelihood of success for one of ordinary skill to combine the teachings of Eisenberg with the teachings of Askenazi and Friend. Thus, Applicants respectfully submit that the Examiner has not established a *prima facie* case of obviousness for at least these reasons.

#### Independent Claims 36 and 38

Assuming, *arguendo*, that there was a reasonable likelihood of success and a motivation to combine Eisenberg, Askenazi and Friend, Applicants respectfully submit that the combination still would fail to disclose or suggest all elements of independent claims 36 and 38.

Claim 36 is directed to a method for identifying a molecular interaction network representation for a set of interacting molecules. Among other things, the method recited in claim 36 features “determining attraction probabilities between pairs of molecules of the set of interacting molecules based on known molecular interaction data” and “determining an edge probability ... for each possible molecular interaction network.”

The Examiner alleges that Eisenberg discloses “determining attraction probabilities between pairs of molecules” as featured in claim 36. This feature of claim 36 is similar to the features of claim 38 discussed above. As such, Eisenberg fails to disclose or suggest determining attraction probabilities between pairs of molecules as featured in claim 36.

Additionally, as noted above, the method in claim 36 features “determining an edge probability ... for each possible molecular interaction network.” The Examiner acknowledges that Eisenberg does not disclose or suggest this feature of claim 36 but alleges that Askenazi does. (Office Action, pages 10-11). Specifically, the Examiner alleges that Askenazi discloses algorithms for generating a Steiner tree wherein biological elements are represented as vertices and the interactive relationships between said biological elements are represented as edges, as featured in claim 36. (Office Action, pages 10-11). Applicants respectfully disagree.

While Askenazi does describe the use of a Steiner tree and a graph wherein biological elements and relationships between them are represented as vertices and edges, Askenazi does not disclose or suggest determining an edge *probability*...for each possible molecular feature as featured in claim 36. While the vertices and edges described in Askenazi describe relationships between biological elements, it does not describe determining an edge probability. Instead, Askenazi describes the representation of known biological elements and relationships as part of a Steiner Tree which is used to organize data and may be used in a computer algorithm. (*See* Askenazi col. 2, and col. 5, lines 42-61). Organizing data in a Steiner tree as described in Askenazi does not disclose or suggest determining an edge probability as featured in claim 36. In fact, Askenazi does not disclose or suggest determining probabilities at all.

The method of claim 36 also features “determining a posterior probability of said each molecular interaction network using [equation 10].” The Examiner acknowledges that neither Eisenberg nor Askenazi discloses or suggest the use of equations as featured in claim 36, but suggests that this feature is obvious in view of Friend and Perlin. Assuming, *arguendo*, that this feature would be obvious, Applicants respectfully submit that Friend and Perlin fail to overcome the deficiencies of Eisenberg and Askenazi, discussed above.

For at least these reasons, Applicants respectfully submit that claim 36 is non-obvious and patentable over Eisenberg, Askenazi, Friend, and Perlin. As noted above, the method of claim 38 features “determining probability of attraction between the conserved features of [a] molecule and other interacting molecules” and “determining probabilities of molecular interactions of said molecule with each of the other interaction molecules based on the probabilities of attraction” which are similar to features of claim 36. For at least the reasons given above with respect to the rejection under 35 U.S.C. § 102(e) and the rejection of claim 36

under § 103(a), Applicants submit that claim 38 is also non-obvious and patentable over Eisenberg, Askenazi, Friend and Perlin.

Claims 37 and 39-45

Claims 37 and 39-45 depend from independent claims 36 and 38. As such, these claims are also allowable.

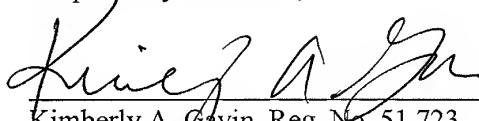
Based on the foregoing Amendment and Remarks, Applicants traverses Examiner's rejection of claims 36-45 under 35 U.S.C. § 101, 112, 102, and 103.

Conclusion

On the basis of the foregoing Amendments and remarks, Applicants respectfully submit that the pending claims of the present application are allowable over the prior art of record. Applicants thus respectfully request the previous rejections and objections be withdrawn, and that the pending claims be allowed by the Examiner. Favorable consideration and timely allowance of this application are respectfully requested. In the event that the application is not deemed in condition for allowance, the Examiner is invited to contact the undersigned in an effort to advance the prosecution of this application.

In addition to the petition for a three-month extension of time, and the petition for revival, Applicants believe that no additional fee is due in connection with the filing of this Response. However, Applicants authorize, in the Fee Transmittal Form, the Director to charge payment of any additional fees or credit any overpayment associated with this Response to Deposit Account No. 02-4377.

Respectfully submitted,

  
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